From the seas surrounding the Florida Keys to the beaches of Corpus Christi, clean water is the foundation for the quality of life and ocean-based economy of the Gulf States. The sustainability of the Gulf's marine resources is under increasing pressure from land development and coastal and commercial activities. The loss of corals, non-point source nutrient pollution, invasive species, harmful algal blooms, depleted fish stocks and beach closings present potential threats to the economies of the Gulf States.

Water Quality Strengths: Existing Monitoring and Agency Networks

Federal, State and local initiatives have established a fundamental framework for water quality management, including:

- State surface water classifications.
- National Pollution Discharge Elimination System for permitting wastewater and stormwater discharges.
- Total Maximum Daily Load (TMDL) programs to restore degraded waters.
- Water quality monitoring and assessment networks for coastal waters.
- Elimination of waste and ballast water discharges from cruise ships and live-aboards.
- National Estuary Programs.
- Florida's Shellfish Environmental Assessment Section Program.
- Harmful Algal Bloom Observing System.
- Gulf Coast Ocean Observing System.
- Beach bacteria monitoring and public notification.

Water Quality Challenges and Scientific Barriers

Agencies face a number of challenges in assessing, researching and addressing localized and episodic water quality problems, including eutrophication, bacteria, harmful algal blooms, hypoxia and the impacts of pollution on fish and wildlife. Barriers include:

- Appropriate water quality standards for assessing ecological health.
- Adequate data and appropriate estuarine criteria for dissolved oxygen.
- Availability of tracking tools for identifying and addressing bacteria sources.
- Understanding the relationship between human and animal bacterial sources and the potential for human illness.
- Availability of tools for defining the relationship between land use and water quality.
- Assessing the cumulative impacts of coastal development, natural habitat loss, hydrologic alteration and increased freshwater use on water quality.

Solutions and Opportunities to Improve and Protect Water Quality

Since the Gulf States face similar threats to water quality, an opportunity exists to enhance partnerships and collaboratively improve science, research and understanding to better protect aquatic life, reduce pollution and improve water quality. Recommendations for expanded collaborative research include:

- A **comprehensive water quality monitoring** program that includes tidal streams and a wide-range of monitoring criteria. The far-reaching data can be used to develop guidance for coastal development activities.
- Develop **GIS tools** to relate land use, habitat quality and best management practices to water quality.
- Develop **bacterial source tracking** methods to better identify, define sources and prevent beach and shellfish contamination.
- Develop **biological assessment tools**, particularly scientifically defensible estuarine biological indicators, to determine natural conditions, the locations of degraded communities, and the success of current pollution controls.
- Develop methods to detect, identify causes and **reduce harmful algal blooms**.
- **Monitor mercury** and other toxics in estuarine and marine fish and expand the quality, quantity and spatial extent of scientific data to fully protect public health.

Needs from a State-Federal Partnership to Improve Water Quality

- Assistance in developing modeling tools to relate watershed-wide land use activities to water quality, incorporating estuarine waters and with a focus on non-point source pollution control.
- A concentrated effort to develop and standardize bacterial source tracking methods to ensure accurate, reproducible data for identifying impairment and source contribution ratios, establishing TMDLs, preventing pollution and restoring waterways.
- Assistance in biological assessment tool development, including identification of indicator organisms.
- Epidemiological studies focused on fecal contamination in recreational waters and relative illness risks.
- Improved indicators of bacterial pollution.
- Continued efforts to address sources of toxic contamination in Gulf and estuarine fish from local and wider sources.
- Assistance in investigating the potential causes of harmful algal blooms.
- Coordinated data collection to improve efficiency, prevent duplication and promote standardization and comparability of methods and data.
- Increased data and information sharing through a web-based Gulf of Mexico database.